REMARKS

Applicants have amended claim 1 to more particularly point out and distinctly claim the subject matter which they regard as their invention. Applicants have also amended claim 34 to correct typographical errors. No new matter has been introduced by the above amendments.

Claims 1, 7-10, 12-15, and 34-48 are currently pending. Reconsideration of this application, as amended, is respectfully requested in view of the remarks below.

Rejections under 35 U.S.C. § 112

The Examiner rejects claims 1, 7-10, and 12-15 for indefiniteness. More specifically, he asserts that the phrase "by being heated in gas phase" recited in claim 1 is indefinite. Apparently, he is of the position that it is unclear whether the heating step is performed on gaseous nanoclusters or involves using heated gas.

Applicants have amended claim 1 to promote clarity. Claim 1, as amended, recites "generating magnetic nanoclusters in gas phase; heating the magnetic nanoclusters..." It is now clear that the heating step is performed on gaseous nanoclusters.

Rejections under 35 U.S.C. § 102(e)

The Examiner rejects claims 34, 38, 42, and 45 for anticipation, relying on Shimizu et al., U.S. Patent Application Publication 20030091868 (Shimizu). Claims 34 and 42, the two independent claims, will be discussed first.

Claim 34 covers a method of forming a thin film magnetic recording media, which includes (1) generating magnetic nanoclusters, (2) mixing the magnetic nanoclusters with a non-magnetic material, (3) crystallizing the magnetic nanoclusters, and (4) depositing the magnetic nanoclusters onto a substrate.

Shimizu teaches producing a magnetic recording medium by sequentially forming on a substrate a soft undercoat film, an orientation-regulating film, a perpendicular magnetic film, and a protective film. See paragraph 0031. The perpendicular magnetic film may have a multi-layer structure in which intermediate layers are located between magnetic layers. The magnetic layers

contain magnetic nanocrystals (corresponding to the nanoclusters recited in claim 1) and the intermediate layer may be formed from a non-magnetic material such as C, Si, and B. As the magnetic nanocrystals and the non-magentic material are located in different layers formed sequentially, Shimizu clearly does not teach mixing the magnetic nanoclusters with a non-magnetic material, as required by claim 1. Thus, this reference does not anticipate claim 1.

Of note, the Examiner asserts that "Shimizu et al. discloses a method for forming a thin film magnetic recording media comprising: [] mixing the magnetic nanoclusters with a non-magnetic material such as Pd or Pt (paragraphs 0114 and 0148)..." See the Office Action, page 4, lines 2-4. Applicants respectfully disagree and reproduce below the two paragraphs relied on by the Examiner:

> [0114] The perpendicular magnetic film 4 may have a multi-layer structure in which layers formed from a transition metal material (e.g., Co, Co alloy, Fe, or Fe alloy) and layers formed from a noble metal material (e.g., Pd, Pd alloy, pt, or Pt alloy) are **laminated repeatedly** (emphasis added).
>
> .....
>
> [0148] In order to cause the perpendicular magnetic film 4 to have a multi-layer structure including transition metal layer and noble metal layers, the film is formed by carrying out, **in alternating fashion**, sputtering by use of a first target containing a transition metal (e.g., Co or Co alloy) and sputtering by use of a second target containing a noble metal (e.g., Pt or Pd) (emphasis added).

As indicated in the above two paragraphs, layers containing Pd or Pt and layers containing magnetic crystals (e.g., Fe) are formed separately, i.e., **laminated repeatedly** or formed **in alternating fashion**. In other words, Pd or Pt is not mixed with magnetic crystals. Thus, contrary to the Examiner's assertion, these two paragraphs do not teach mixing magnetic nanoclusters with a non-magnetic material such as Pd or Pt.

Turning to claim 42, it covers a method for forming a thin film magnetic recording media, which includes (1) generating magnetic nanoclusters, (2) crystallizing the magnetic nanoclusters; and (3) depositing the magnetic nanoclusters onto a substrate to form a thin film of

magnetic particles thereon. The method further includes providing a magnetic field adjacent to the substrate to control the orientation of the magnetic particles upon deposition.

Referring to a recording system described in Shimizu, the Examiner asserts that this reference describes applying a magnetic field to a magnetic recording medium containing magnetic particles. In other words, he believes that Shimizu discloses providing a magnetic field adjacent to the substrate upon disposition, as required by claim 42. Again, Applicants disagree.

Shimizu's recording system is used to write data on a magnetic recording medium, which contain magnetic nanoclusters. At the time the data is written on a magnetic recording medium, the magnetic nanoclusters have already been deposited on the substrate of the magnetic recording medium. Thus, in Shimizu's recording system, a magnetic field is not used when nanoclusters are deposited on a substrate. By contrast, claim 42 requires a magnetic field be used when magnetic nanoclusters are deposited on a substrate (i.e., upon deposition). Thus, contrary to the Examiner's belief, Shimizu does not anticipate claim 42.

In view of the above remarks, Applicants submit that claim 38, dependent from claim 34, and claim 45, dependent from claim 42, are also not anticipated by Shimizu for the same reasons.

Rejections under 35 U.S.C. § 102(b)

The Examiner rejects claims 1, 9, 10, 34, and 37 for anticipation, relying on Ryonai et. al., U.S. Patent No. 6,242,085 (Ryonai). Claims 1 and 34, the two independent claims, will be discussed first.

Claim 1 covers a method for forming a thin film magnetic recording medium, which includes (1) generating magnetic nanoclusters in gas phase, (2) heating the magnetic nanoclusters, (3) crystallizing the magnetic nanoclusters, and (4) depositing the magnetic nanoclusters onto a substrate to form a thin film. In other words, claim 1 requires heating the magnetic nanoclusters before the crystallizing and depositing steps.

Ryonai discloses a thin film magnetic recording medium including a glass substrate, an underlying non-magnetic layer, a magnetic layer, a protective layer, and a lubricant layer. See column 3, lines 44-48. The magnetic layer is formed by generating magnetic nanoclusters and

crystallizing the nanoclusters on a substrate having an underlying non-magnetic layer. See column 4, lines 3-12. Ryonai points out that "[a]s the substrate temperature is raised, the growth of the magnetic crystals is accelerated." See column 6, lines 37-38. Relying on this passage, the Examiner asserts that "[w]hile it is the substrate that is heated (instead of using a heated gas atmosphere), the nanocrystals on the substrate are also heated [], therefore it is the Examiner's position that the claim limitation of crystallization 'by heated in gas phase' is met by the Ryonai et al. reference." See the Office Action, page 5, lines 2-7. Applicants would like to bring to the Examiner's attention that Ryonai at most teaches heating and depositing steps are performed at the same time. By contrast, claim 1 requires that the heating step be performed before the depositing step. As Ryonai does not teach heating the gaseous nanoclusters before depositing them on a substrate, it clearly does not anticipate claim 1.

We now turn to claim 34. As mentioned above, this method claim requires mixing magnetic nanoclusters with a non-magnetic material. Ryonai teaches a thin film magnetic recording medium including, among others, a non-magnetic layer and a magnetic layer. Clearly, a non-magnetic material and magnetic material are included in different layers. As a non-magnetic layer and a magnetic layer of the thin film have to be formed separately, this reference does not disclose mixing a non-magnetic material and a magnetic material. Thus, it fails to anticipate claim 34, which requires mixing the magnetic nanoclusters with a non-magnetic material.

The Examiner errs in asserting that "Ryonai et. al, teaches that the magnetic nanoclusters are mixed with a non-magnetic material (col. 4, lines 13-22)." See the Office Action, page 5, lines 8-9. The passage mentioned by the Examiner merely lists examples of a magnetic material and a non-magnetic material. Contrary to the Examiner's assertion, it does not mention mixing the magnetic material and the non-magnetic material.

In view of the above remarks, Applicants submit that claims 9 and 10, depend from claim 1, and claim 37, dependent from claim 34, are also not anticipated by Ryonai for the reasons set forth above.

Rejections under 35 U.S.C. § 103(a)

The Examiner rejects for obviousness (1) claims 1, 12-15, 39-41, and 46-48, relying on Shimizu; and (2) claims 12-15, 38-42, and 45-48, relying on Ryonai in view of Shimizu.

The patentability of claims 1 and 12-15 resides at least in part in heating magnetic nanoclusters before crystallizing and depositing them on a substrate, a limitation of claim 1 and claims 12-15 dependent therefrom (referred to as limitation 1 below). The patentability of claims 38-41 resides at least in part in mixing magnetic nanoclusters with a non-magnetic material, a limitation of claim 34 and claims 38-41 dependent therefrom (referred to as limitation 2 below). The patentability of claims 42 and 45-48 resides at least in part in providing a magnetic field adjacent to a substrate to control the orientation of magnetic particles upon their deposition, a limitation of claim 42 and claims 45-48 dependent therefrom (referred to as limitation 3 below).

As already discussed above, Shimizu is silent on limitations 2 and 3. It is also silent on limitation 1. Thus, Shimizu does not teach or suggest any of limitations 1, 2, and 3. Neither does Ryonai.

As Shimizu and Ryonai do not teach or suggest any of limitations 1, 2, and 3, claims 1, 12-15, 38-42, and 45-48, each of which requires at least one of the three limitations, are not rendered obvious by these two references, either alone or in combination.

Allowable subject matter

The Examiner acknowledges that claims 7, 8, 35, 36, 43, and 44 cover allowable subject matter. However, he objects to these claims for depending from rejected base claims, i.e., claims 1, 34, and 42. As discussed above, the rejections of claims 1, 34, and 42 are believed to have been overcome. Thus, claims 7, 8, 35, 36, 43, and 44, as now pending are in condition for allowance.

CONCLUSIONS

Applicants submit that the rejections asserted by the Examiner have been overcome and all pending claims are novel and unobvious over the cited prior art references. Applicants therefore respectfully request that all pending claims be allowed.

Please apply any charges to deposit account 06-1050, referencing Attorney's Docket No. 17184-002001.

Respectfully submitted,

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